

**EXAMINER'S AMENDMENT**

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Peter K. Skiff on February 25, 2010<sup>1</sup>.

The application has been amended as follows:

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<sup>1</sup> See attached fax transmission and interview summary.

25. (Currently Amended) A gas injector for supplying process gas to a plasma processing chamber wherein a semiconductor substrate is subjected to plasma processing, the gas injector comprising:

gas injector body of dielectric material and sized to extend in an axial direction through a chamber wall of the processing chamber such that a planar distal end surface of the gas injector body is exposed within the processing chamber, the gas injector body including a bore defined by a cylindrical side wall and an endwall and a plurality of gas passages in fluid communication with the bore, the gas passages adapted to supply process gas into the processing chamber, wherein the gas passages include gas inlets located in the endwall and gas outlets located in the planar distal end surface of the gas injector body with the total area of the gas outlets less than the cross-sectional area of the bore and the gas outlets are sized to inject the process gas at a subsonic, sonic or supersonic velocity;

wherein all of the gas inlets are closer to a central axis of the bore than the gas outlets and all of the gas inlets [of the angled gas passages] are located equal distances from the central axis of the bore.

26-27. (Cancelled)

28. (Currently Amended) The gas injector of Claim 25, the gas injector body further includes [passages include] a center gas passage extending in the axial direction [and a plurality of angled gas passages extending at an acute angle to the axial direction].

29. (Previously Presented) The gas injector of Claim 25, wherein the gas injector includes a planar axial end face which is dimensioned so as to be flush with an interior surface of a dielectric window forming the chamber wall.

30. (Previously Presented) The gas injector of Claim 29, wherein the gas injector includes at least one seal adapted to contact the dielectric window when the gas injector is mounted in the dielectric window.

31. (Currently Amended) The gas injector of Claim 25, wherein the gas passages [include a plurality of angled gas passages which] inject process gas at an acute angle relative to a plane parallel to the distal end surface.

32. (Previously Presented) The gas injector of Claim 25, wherein the gas injector is adapted to be removably mounted in an opening in the chamber wall and includes at least one O-ring providing a vacuum seal between the gas injector and the chamber wall.

33. (Previously Presented) The gas injector of Claim 25, wherein the gas injector body includes a surface adapted to overlie an outer surface of the chamber wall.

34. (Previously Presented) The gas injector of Claim 25, wherein the gas injector body includes an annular flange adapted to overlie and contact an outer surface of the chamber wall.

35. (Previously Presented) The gas injector of Claim 25, wherein the gas injector body includes at least one O-ring seal on an outer surface of the gas injector body.

36. (Previously Presented) The gas injector of Claim 25, wherein the gas injector body includes a first O-ring seal on an outer surface of the gas injector body and a second O-ring seal in a surface of a flange extending from the outer surface of the gas injector body.

37. (Cancelled)

38. (Previously Presented) The gas injector of Claim 25, wherein all of the gas passages supply process gas through the distal end surface of the gas injector body.

39. (Currently Amended) A gas injector for supplying process gas to a plasma processing chamber wherein a semiconductor substrate is subjected to plasma processing, the gas injector comprising:

    a gas injector body sized to extend in an axial direction through a chamber wall of the processing chamber such that a distal end surface of the gas injector body is exposed within the processing chamber, the gas injector body including a plurality of gas passages adapted to supply process gas into the processing chamber and a cylindrical bore adapted to supply gas to the gas passages, the cylindrical bore being defined by a sidewall and an endwall which extends radially inwardly from the sidewall and the gas passages including gas inlets located in the endwall and gas outlets located in the distal end surface, the gas passages including a center gas passage extending in the axial direction and a plurality of angled gas passages extending at an acute angle to the axial direction, wherein all of the gas inlets of the angled gas passages are closer to a central axis of the bore than the gas outlets of the angled gas passages and all of the gas inlets of the angled gas passages are located equal distances from the central axis of the bore;

    an annular flange having a surface adapted to overlie and contact an outer surface of the chamber wall; and

    a first O-ring in the surface of the flange for sealing against the outer surface of the chamber wall.

40. (Previously Presented) The gas injector of Claim 39, comprising a second O-ring seal on an outer surface of the gas injector body.

41. (Currently Amended) A gas injector for supplying process gas to a plasma processing chamber wherein a semiconductor substrate is subjected to plasma processing, the gas injector comprising:

a gas injector body sized to extend axially through a chamber wall of the processing chamber such that a distal end surface of the gas injector body is exposed within the processing chamber, the gas injector body including a plurality of gas passages adapted to supply process gas into the processing chamber, wherein the gas injector body includes a uniform diameter central bore adapted to supply gas to the gas passages, the central bore extending axially from an upper axial end face of the gas injector body, the central bore being defined by a cylindrical sidewall and a planar endwall extending between the cylindrical sidewall and the gas passages include gas inlets located in the planar endwall and gas outlets located in the distal end surface of the gas injector body, the gas passages being sized to inject the process gas at a subsonic, sonic or supersonic velocity, wherein all of the gas inlets are closer to a central axis of the bore than the gas outlets and all of the gas inlets [of the angled gas passages] are located equal distances from the central axis of the bore.

42. (Currently Amended) A gas injector for supplying process gas to a plasma processing chamber wherein a semiconductor substrate is subjected to plasma processing, the gas injector comprising:

gas injector body made of a dielectric material selected from the group consisting of quartz, alumina and silicon nitride and sized to axially extend through a chamber wall of the processing chamber such that a planar distal end surface of the gas injector body is exposed within the processing chamber, the gas injector body including a bore defined by a cylindrical sidewall and an endwall and a plurality of gas passages adapted to supply process gas into the processing chamber, wherein the gas passages include gas inlets located in the endwall and gas outlets located in the planar distal end surface of the gas injector body and the gas passages being sized to inject the process gas at a subsonic, sonic or supersonic velocity;

wherein all of the gas inlets are closer to a central axis of the bore than the gas outlets and all of the gas inlets [of the angled gas passages] are located equal distances from the central axis of the bore.

43. (Currently Amended) The gas injector of Claim [28] 25, wherein the gas injector body includes 8 of the [angled] gas passages.

44. (Currently Amended) The gas injector of Claim [28] 25, wherein the gas passages extend at an acute angle relative to the axial direction and the acute angle is 10 to 70°.

45. (Currently Amended) The gas injector of Claim [28] 25, wherein the [angled] gas passages direct the process gas such that the process gas does not flow directly towards a substrate being processed.

*Allowable Subject Matter*

2. Claims 25, 28-36, and 38-45 are allowed.

3. The following is a statement of reasons for the indication of allowable subject matter: Deacon; Thomas E. et al. (US 5792269 A) and Koshimizu; Chishio (US 5935373 A) are cited as the closest prior art. With respect to Applicant's injector's general structure and function, Koshimizu's injector 156, Figure 1 is close in function and design. However, the claimed injector differs from Koshimizu's injector in numerous features cited in the Examiner's final rejection. See final rejection starting at page 4. Deacon's injector 40; Figure 4A teaches plural angled passages (42; Figure 5,6, 10-19) as noted in the final rejection at page 8. However, Deacon's passages at Figure 19, which is closest in design as Applicant's passages, does not show that *all* the gas inlets are "closer to a central axis of the bore than the gas outlets and *all* the gas inlets are located equal distances from the central axis of the bore", as independently claimed.

#### ***Conclusion***

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272-1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 6pm EST. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272- 1435.

/Rudy Zervigon/

Primary Examiner, Art Unit 1792